SUBJ: Development and Implementation of Remote Monitoring Subsystems (RMS) within the National Airspace System (NAS)

1. **PURPOSE.** This order defines the responsibilities, as they relate to the procurement life cycle of the Remote Monitoring Subsystem (RMS), of program offices assigned engineering responsibility for Facilities & Equipment (F&E) projects and the Remote Maintenance Monitoring (RMM), AND-130. It also provides a listing of the current standards and guidelines that apply to the RMS as well as establish the vehicle for the exchange of information between the respective program offices. This order consolidates traditional program office responsibilities required to integrate the RMS into the Remote Maintenance Monitoring System (RMMS) and the RMMS into the National Airspace System (NAS).

2. **DISTRIBUTION.** This order is distributed to Division level in the Associate Administrator for Research and Aquisitions (ARA), Office of Communications, Navagation, and Surveilance Systems (AND), Office of Acquisitions (ASU), Office of Air Traffic Systems Standards (AUA), and the Office of Aviation Research (AAR), in the Federal Aviation Administration (FAA) Washington headquarters and the division level at FAA Technical Center (ACT).

3. **CANCELLATION.** Order 6090.1, Development and Implementation of Remote Monitoring Subsystems (RMS) within the National Airspace System (NAS), dated June 6, 1988, is cancelled.

4. **BACKGROUND.** Order 6000.30B, Policy for Maintenance of the NAS through the year 2000, specifies that all future NAS subsystems shall be candidates for a Remote Maintenance Monitoring (RMM) capability. Existing NAS subsystems shall be retrofitted for Remote Maintenance Monitoring (RMM) capability to a degree based on a system cost-benefit analysis. AND-130 has the responsibility for ensuring proper implementation of the RMMS within the NAS. As program offices develop and procure RMS's as part of the RMMS, new program office coordination responsibilities are created. This order reiterates the existing responsibilities and allocates them and the new responsibilities to either the program office responsible for F&E projects or AND-130.

5. **RMS IMPLEMENTATION POLICY.** Program offices are responsible for compliance with the latest version of the following documents. The NAS System Specification, NAS-SS-1000 that defines those NAS systems which have an RMS and, for each NAS subsystem's RMS, allocates high level, functional and performance requirements. The Remote Maintenance Monitoring System Functional Requirements for Remote Monitoring Subsystem (RMS), NAS-MD-793, defines the functional requirements of RMS at a lower level than NAS-SS-1000 and will further allocate system specific requirements. The Remote Monitoring Subsystem/Maintenance Processor Subsystem (RMS/MPS) Interface Requirements Document, NAS-IR-51035101 defines the interface requirements between the RMS

and MPS, including message formatting and connectivity requirements. This order does not alter these requirements, but it does allocate and further define the various RMS-related responsibilities assigned to program offices responsible for F&E projects requirements and design.

6. <u>PARTICIPATING ORGANIZATIONS AND THEIR RESPONSIBILITIES</u>. The program office assigned engineering responsibility for a particular facility or equipment is also responsible for the design and development of the associated RMS embedded in or retrofitted to the facility or equipment. The program office is responsible for ensuring that the appropriate RMS requirements are included in the F&E project requirements and design. AND-130 is responsible for the RMS integration into the RMMS and the RMMS integration into the NAS. The Associate Program Manager for Test (APMT), ACT-330, is responsible for coordination of testing. This order will apply to new F&E projects requiring an RMS and, to the extent possible, current F&E projects requiring an RMS. This order consolidates material contained in other Department of Transportation (DOT)/FAA orders, which document F&E project requirements and responsibilities. This order allocates these responsibilities and new responsibilities to either the program office responsible for F&E projects required to have an RMS or AND-130 as follows:

   a. <u>Program Office Responsibilities</u>. The program office shall:

      (1) Write and coordinate a Letter of Agreement (LOA) between the program office and AND-130, in accordance with the guidelines provided in appendix 1. This LOA shall indicate the RMS-related activities to be accomplished, the organization responsible for performing or coordinating each activity, the anticipated schedule for completion, and the estimated RMS-related F&E project funding requirements, including the sources of the funding. The LOA shall be completed early in the F&E project life cycle, prior to the development of the equipment specification and Statement of Work (SOW). This LOA shall be coordinated with AND-130 to determine the appropriate content, and it shall serve as a common agreement of program office and AND-130 responsibilities. All affected organizations must concur with the LOA.

      (2) Ensure that all RMS requirements, as defined in the NAS technical baseline and other documentation (refer to paragraph 8, Governing Documentation), are included as part of the F&E project design effort. The RMS requirements for the total facility should also include environmental, security, and fire safety requirements. The program office shall coordinate with Automation Operations Systems Division, AOP-300 and AND-130 to determine the RMS operational requirements applicable to their F&E project.

      (3) Have a cost-benefit analysis prepared by Program Analysis and Operations Research (AOR-100) for their respective RMS's. The analysis shall include the impact on the RMMS cost-benefits. The analysis must be coordinated with AND-130 and will be used in determining whether the RMS is to be funded. Provide AND-130 with a detailed cost breakdown for RMS-related work on the F&E project if any part of the project is to be funded by AND-130. Coordinate with AND-130 on any subsequent changes and the reasons for those changes.

(4)   Ensure that the F&E project specification includes the RMS requirements in accordance with the appropriate requirements documents specified in paragraph 8. Also, ensure that the Verification Requirements Traceability Matrix (VRTM) is in accordance with the latest editions of FAA Standard FAA-STD-005, Preparation of Specification Documents, and Order 1810.4B, FAA NAS Test and Evaluation Policy. These program office documents shall be coordinated with AND-130 prior to baselining.

(5)   The RMS shall be accommodated in the project SOW. This document shall be coordinated with AND-130 prior to baselining. Modifications to the contract affecting the RMMS shall be coordinated with AND-130.

(6)   Include the RMS in the project Test and Evaluation Master Plan (TEMP)in accordance with the latest edition of Order 1810.4B. The program office shall be responsible for verifying that the RMS, built in accordance with the approved interface control document (ICD), will properly interface with the Maintenance Processor Subsystem (MPS) when ACW-300 performs the interface testing. Because the MPS integration involves the Interim Monitor and Control Software IMCS (AND-130 responsibility) as well as the RMS software (program office responsibility), it is necessary to coordinate all pertinent ICD's and related interface documentation with AND-130. Coordinate with ACW-300 if their participation is required to witness contractor testing.

(7)   Ensure that the contractor test plans and procedures include the RMS requirements as stated in the contract and are in accordance with the latest edition of FAA-STD-024, Preparation of Test Plans and Evaluation Documentation, and incorporate the activities outlined in Appendix 2, Test and Evaluation Flow Task Descriptions. These plans/procedures shall be coordinated with AND-130 prior to use.

(8)   Ensure that the contractor's ICD as required by the contract includes the RMS requirements. The program office shall ensure that all ICD's are developed in accordance with the latest edition of, at the time of contact award, FAA-STD-025, Preparation of Interface Documentation . The draft ICD shall be ready at Preliminary Design Review (PDR) per Mil-STD-1521. Technical Reviews and Audits for Systems, Equipment and Computer Software, are to be finalized prior to completion of Critical Design Review (CDR). In addition, the program office shall ensure that interfaces designed to NAS-IR-51035101 are developed in accordance with the Government-Furnished Equipment (GFE) ICD Development Tool (ICDDT) software, provided by AND-130. The ICD data base output shall be provided to AND-130 on magnetic media and hard copy in accordance with the ICDDT. All interfaces not designed to NAS-IR-51035101 shall be developed in accordance with the appropriate NAS Interface Requirements Document (IRD). The program office shall ensure that AND-130 is provided a minimum of 30 days to review all iterations of RMS-related ICD's. The program office shall ensure that all RMS-related comments are resolved before the document is baselined. All changes to the ICD affecting the RMMS shall be coordinated with AND-130 prior to approval. The contractor's baselined ICD, under NAS configuration control, shall be available at least one year prior to the first ORD. Any changes to the ICD after baselining shall be submitted to the NAS Change Proposal (NCP) process. The schedule requirements for the ICD shall be included in the LOA.

(9)   Ensure availability of the RMS for a period of one month for the purpose of IMCS confidence testing, under the direction of ACN-100D. This test shall commence a minimum of 6 months prior to the F&E projects first ORD. Additionally, upon delivery of the baselined ICD, or a minimum of 6 months prior to the expected date of confidence testing commencement, the program office will inform AND-130 and the Systems management Service, Telecommunications Management and Operations Division (AOP-400), of the location and schedule of RMS availability for confidence testing. The program office shall also coordinate with AOP-400 and appropriate regional personnel with regard to providing connectivity from the RMS to MPS to support testing. This coordination effort shall include the appropriate regional office and MPS affected.

(10)   Include the RMS in the Project Implementation Plan (PIP), developed in accordance with the latest edition of FAA-STD-036, Preparation of Project Implementation Plans. Changes affecting the RMMS shall be coordinated with AND-130.

(11)   Provide for AND-130 participation in all RMS project technical reviews, including Preliminary Design Reviews (PDRs) and CDRs. Coordinate all proposed RMS-related meeting schedules with AND-130 before they are finalized.

(12)   One year prior to the first RMS installation or when CDR is accomplished, whichever occurs first, the program office will submit to AND-130 and AOP-400 the F&E project installation schedules and RMS to MPS connectivity information for all planned installations. Spectrum Policy Management (ASR-100) shall be coordinated with if data transmission requires radio frequencies. Prior to this submission, the program office will coordinate with AND-130 and the appropriate regions to obtain this connectivity information. This information will be used by AOP-400 support RMS telecommunications requirements. Any changes or updates to these schedules shall be coordinated with AND-130, AOP-400 and with ASR-100 when radio frequencies are used. This information is required far in advance of the project installation to ensure proper implementation, capacity planning, and communication resource allocation. The program office will ensure that the physical communications connection is provided between each RMS and the appropriate data multiplex network (DMN).

(13)   Include the RMS's in the project milestone schedule in the Master Scheduling System (MSS).

(14)   Include the RMS's in the facility specific delivery schedule in the Material Delivery Forecasting Module (MDFM). Location names should be placed in the MDFM at contract award or earlier.

(15)   Include the RMS's in the project status report to the Program Director Status Review (PDSR). Specific milestones selected shall be adequate to assess project progress. Include the RMS's in the Integrated Logistics Support Plan (ILSP) in accordance with the National Airspace Integrated Logistics Support (NAILS) Master Plan. Include AND-130 participation in the F&E project NAILS Management Team (NAILSMT). Submit all required F&E project RMS-related NCP's to the program office's Configuration Control Board (CCB) to which AND-130 shall be designated as an ad hoc member.

(16)   Notify AND-130 when the Deployment Readiness Review (DRR) will occur.

(17)   Budget and provide funding for the RMS portion of F&E projects in accordance with subparagraph 7.

b.   <u>AND-130 Responsibilities</u>. AND-130 shall ensure overall compliance with the NAS technical baseline and ascertain the suitability of each RMS for interconnectivity into the RMMS. To accomplish this AND-130 shall:

(1)   Review and comment on the F&E project specification and SOW for compliance with the NAS technical baseline.

(2)   Direct IMCS module development, testing and Independent Verification and Validation (IV&V) (after the delivery of a baselined ICD from the respective F&E project contractor). There is a one-year lead time requirement between the baselined ICD delivery and the IMCS module completion.

(3)   Budget and provide funding for the RMS portion of F&E projects in accordance with subparagraph 7.

(4)   Direct the integration of the RMS testing into the MPS testing. (The program office will provide an opportunity for testing within the contract.)

(5)   Direct the performance of IMCS confidence testing a minimum of 6 months prior to the F&E projects first ORD. ACN-100D shall provide an IMCS RMS Confidence Test Report to the program office 30 days after completion of the test.

(6)   As appropriate, participate in project technical reviews and DRR's.

(7)   Make available to the program office the GFE MPS simulator software for use by the contractor in developing link-level protocol between the RMS and the MPS.

(8)   Make available to the program office the GFE ICDDT for use by the F&E project to assist in the development of the RMS and related ICD.

(9)   Provide technical assistance to the program office on application and interpretation of RMS governing documentation.

(10)   Review and provide comments on the F&E project contractor's RMS test plans and procedures.

(11)   Support coordination with the program office and AOP-400 to determine the requirements for connectivity between the RMS and the MPS. AND-130 will ensure that physical communications connection is provided between the appropriate MPS and the Air Route Traffic Control Center (ARTCC) data multiplex network.

7. <u>FINANCIAL</u>.   Each program office is responsible for establishing and maintaining F&E project cost baselines in accordance with NAS Program Director guidelines. AND-130 will fund the OT&E Integration and Operational testing of the RMMS as listed in paragraph 6b(4). The particulars of the funding arrangements shall be detailed in the program office to AND-130 LOA for each individual project. The RMS-related activities generally funded by AND-130 are:

    a.   RMS retrofits.

    b.   Development of a test bed for performance testing of RMMS.

    c.   Test planning and procedures development for IMCS confidence testing and Operational Test and Evaluation (OT&E) performance/integration testing.

    d.   RMS-MPS IMCS confidence testing and performance/integration testing.

    e.   Program Manager for Test (ACD-300), NAS OT&E Integration, and NAS OT&E Operational testing of the RMS.

    f.   Development of IMCS module.

    g.   National Automation Engineering Field Support Division (AOS-530) key site testing of IMCS module.

    h.   IMCS training.

    i.   MPS simulator, RMS simulator, and ICDDT development.

    j.   MPS simulator, RMS simulator, and ICDDT documentation development.

    k.   Technical assistance for F&E project contractor use of MPS simulator, RMS simulator, and ICDDT.

    l.   Maintenance Data Terminal (MDT) IRD.

    m.   MDT applications software.

    n.   MDT training.

8. GOVERNING DOCUMENTATION. The current version of the following documents
is provided for reference only. Each of these documents discusses RMS's in
varying degrees, and the most current versions should be used in RMS
development, where appropriate.

  a. Capital Investment Plan (for) Facilities, Equipment and Associated
      Development.

  b. NAS-SR-1000, System Requirements Specification.

  c. NAS-DD-1000, Level I Design Document.

  d. NAS-SS-1000, NAS System Specification.

  e. Order 1810.4, FAA NAS Test and Evaluation Policy.

  f. Order 6000.30, Policy for Maintenance of the National Airspace System
      (NAS) through the year 2000.

  g. NAS-MD-792, Operational Requirements for the Remote Maintenance
      Monitoring System (RMMS).

  h. NAS-MD-793, Remote Maintenance Monitoring System Functional
      Requirements for the Remote Monitoring Subsystem (RMS).

  i. National Airspace Integrated Logistics Support (NAILS) Master Plan.

  j. NAS-IR-51030002; Maintenance Processor Subsystem (MPS) to Automation
      Subsystems Interface Requirements Document (IRD).

  k. NAS-IR-51034302; Maintenance Processor Subsystem (MPS) to Network
      Control Center (NCC) Interface Requirements Document (IRD).

  l. NAS-IR-51034201; Maintenance Processor Subsystem (MPS) to Voice
      Switching & Control System (VSCS) Interface Requirements Document
      (IRD).

  m. Order 1800.8F, NAS Configuration Management.

  n. NAS-IR-51035101, Remote Monitoring Subsystem/Maintenance Processor
      Subsystem (RMS/MPS), Interface Requirements Document (IRD).

  o. FAA-STD-024 Test and Evaluation.

  p. FAA-STD-025 Preparation of Interface Documentation.

  q. FAA-STD-036 Preparation of Project Implementation Plans.

  r. MIL-STD-1521 Technical Reviews and Audits for Systems, Equipments,
      and Computer Software; 4 Jun 85 and Notice 1, 19 Dec 85

9. <u>ACRONYMS</u>:

APMT	Associate Program Manager for Test
ARTCC	Air Route Traffic Control Center
CDR	Critical Design Review
F&E	Facilities & Equipment
GFE	Government-Furnished Equipment
IRD	Interface Requirements Document
ICD	Interface Control Document
ICDDT	ICD Development Tool
ILSP	Integrated Logistics Support Plan
IMCS	Interim Monitor and Control Software
IV&V	Independent Verification and Validation
LOA	Letter of Agreement
MAP	Maintenance Automation Program
MCS	Monitor and Control Software
MDFM	Material Delivery Forecasting Module
MDT	Maintenance Data Terminal (portable and fixed)
MPS	Maintenance Processor Subsystem
TEMP	Test & Evaluation Master Plan
NAILS	National Airspace Integrated Logistics Support
NAILSMT	NAILS Master Plan.
NAS	National Airspace System
NCP	NAS Change Proposal
ORD	Operational Readiness Demonstration
OT&E	Operational Test & Evaluation
PDR	Preliminary Design Review
PIP	Project Implementation Plan
PL	Product Lead
RMMS	Remote Maintenance Monitoring System
RMS	Remote Monitoring Subsystem
SOW	Statement of Work
T&E	Test and Evaluation
TIM	Technical Interchange Meeting
VRTM	Verification Requirements Traceability Matrix

Loni Czekalski
Director, Office of Communications, Navigation, and Surveillance

APPENDIX 1

(SAMPLE)

Federal Aviation Administration (FAA)

Intra Agency Letter of Agreement

Between

Program Office Name   (AXX-XXX)

Project Name (AXX-XXX)

And

The Maintenance Automation Program (MAP) (AND-130)

_____   _____
                        Date   Date
Intergrated Project Tean Leader for   Intergrated Project Tean Leader for
                                            Maintenance Automation, AND-130

AXX-XXX

_____
                        Date
Manager,   XXX
Engineering Division, AXX-XXX

1.0 SCOPE.

1.1 **Purpose.** The modernization of the National Airspace System (NAS) has generated new interdependencies between Facilities & Equipment (F&E) program offices. Program offices responsible for these interdependencies require a means to effectively negotiate agreements between themselves. This Letter of Agreement (LOA) will provide a management tool that perpetuates a mutual understanding of the requirements and responsibilities of the program office implementing the Remote Monitoring Subsystem (RMS) portion of the facility or equipment and of the Maintenance Automation Program (MAP), AND-130.

1.2 **Objective.** This LOA between the _____ program office and AND-130 will specify the roles and responsibilities that will ensure the successful integration of the _____/RMS into the NAS Remote Maintenance Monitoring System (RMMS). This LOA shall define the work to be performed, the resources to be applied, the responsibility for funding, and the milestone and critical action scheduling requirements. All organizations mentioned in this LOA shall concur with their specific content prior to the acceptance of this document. Order 6090.1A, Development and Implementation of Remote Monitoring Subsystems (RMS) Within the National Airspace System (NAS), shall be used as a guide in developing the content of this agreement.

1.3 **Background.** Order 6090.1A, specifies the requirement and general content for this LOA.

1.4 **Modification of Letter Of Agreement.** This Letter of Agreement can only be modified by mutual agreement of the _____ program office and the MAP. Any revisions or modifications to this agreement will be valid upon signature of the appropriate division level management.

1.5 **Precedence of Letter Of Agreement.** In the event of conflicts between agreements established in this LOA and previous agreements, the agreements cited in this LOA shall take precedence.

2.0 **RESPONSIBILITIES.** The following subparagraphs describe the responsibilities of the _____ program office and AND-130.

2.1 _____ **Product Lead, AXX-XXX, Responsibilities.**

2.1.1 _____/RMS **General Description.** This paragraph should describe the RMS in general, including its basic capabilities and how it integrates into the facility or equipment. A general description of the facility or equipment should be described. It should also identify the external interfaces of the RMS.

2.1.2 **RMS Requirements.** This paragraph should discuss the program office's responsibilities with regard to ensuring that the RMS requirements, as defined in the NAS technical baseline and other documentation (refer to paragraph 3.0, Governing Documentation), are included as part of the F&E project design effort.

2.1.3 <u>Statement of Work (SOW)</u>. This paragraph should describe the RMS content to be included in the F&E project SOW. Indicate how changes will be coordinated with AND-130.

2.1.4 <u>RMS Design Reviews and Technical Interchange Meetings (TIM)</u>. This paragraph should discuss and include the following information regarding the various design reviews:

The program office will inform and invite AND-130 to attend and participate in all appropriate RMS design reviews. These reviews may include System Requirements Review (SRR), System Design Review (SDR), Preliminary Design Review (PDR), Critical Design Review (CDR), TIM's, and other technical meetings involving RMMS-related issues.

2.1.5 <u>Interface Control Document (ICD)</u>. This paragraph should describe the purpose and general content of the applicable ICD.

2.1.5.1 <u>ICD Development</u>. This paragraph should describe the ICD development process including projected draft/final dates and presentation requirements. This section should include the following, as appropriate:

The program office will ensure that the F&E project contractor's ICD incorporates the RMS requirements specified in section 2.1.2. The program office will ensure the contractor ICD is developed in accordance with the latest edition of FAA-STD-025 and the Government-Furnished Equipment (GFE). The GFE includes the ICD Development Tool (ICDDT) and the simulator software both supplied by AND-130. The ICDDT output shall be provided to MAP on magnetic media and hard copy in accordance with the ICDDT and shall be included as an appendix to the ICD. A baselined ICD, under configuration control, shall be available at least one year prior to the first Operational Readiness Demonstration (ORD). It is the program offices responsibility to baseline the ICD via the NCP process. CDR shall not be considered complete until a baselined ICD is available.

2.1.5.2 <u>ICD Review</u>. This paragraph should describe the agreements pertaining to review and resolution of comments. This paragraph should, also, include the following:

For each iteration of the ICD the program office will ensure that AND-130 is provided an opportunity to review (30 day review cycle) and provide comment to any ICD relating to RMMS. All changes to the ICD affecting the RMMS shall be coordinated with MAP prior to approval. The program office will ensure that all RMS-related comments are resolved before the documents are baselined. Any subsequent changes shall be implemented via the NAS Change Proposal (NCP) process.

2.1.6 <u>RMS Testing</u>. This paragraph should describe the program office responsibilities with regard to the RMS testing. It should describe coordination between the program office's, types of testing, periods of availability of the RMS for testing sponsored by other program offices.

2.1.6.1 <u>Confidence Testing</u>. This paragraph should include the following: The program office will ensure availability of the RMS for a period of one month

for the purpose of Interim Monitor and Control Software (IMCS) confidence
testing, under the direction of AND-130. This testing shall commence a
minimum of 6 months prior to first ORD. Additionally, upon delivery of the
baselined ICD, a minimum of 6 months prior to the expected date of confidence
testing commencement, the program office will inform AND-130 and AOP-400 of
the location and schedule of RMS availability for confidence testing.

2.1.6.2 <u>NAS Operational Test & Evaluation (OT&E)/Integration Test</u>. This
section describes the program office's roles and responsibilities in testing
the performance and integration of the _____/RMS into the NAS RMMS.

2.1.6.3 <u>NAS OT&E/Shakedown</u>.

2.1.6.4 <u>Other Testing</u>.

2.1.7 <u>Plans and Procedures</u>. This paragraph should identify all plans,
procedures, and other documentation produced by the F&E project contractor or
program office that relate to the RMS. Delivery schedule information for
these documents should be included in the section titled Schedule
Requirements.

2.1.7.1 <u>Test & Evaluation Master Plan (TEMP)</u>. This paragraph should address
the generation, review, and resolution of comments of the TEMP as it relates
to RMS.

2.1.7.2 <u>Project Implementation Plan (PIP)</u>. This paragraph should address the
generation, review, and resolution of comments of the PIP as it relates to the
RMS.

2.1.7.3 <u>Other</u>.

2.1.8 <u>Data Communications</u>. The paragraph should describe the program
office's roles and responsibilities with regard to data communications. It
should identify the organizations responsible for the coordination and
implementation of the RMS to Maintenance Processor Subsystem (MPS) data
communications requirements. Funding responsibilities should be discussed in
the section titled Funding. The data communications paragraph should, at a
minimum, include the following:

One year before the first RMS installation or when CDR is accomplished,
whichever occurs first, the program office will submit project implementation
schedules and RMS to MPS connectivity information for all planned
installations to AND-130 and AOP-400. Prior to this submission the program
office will coordinate with AND-130 and the appropriate regions to obtain this
connectivity information. This information will be used by AOP-400 to provide
the proper service to support the RMS telecommunications requirements. The
project implementation schedules and updates to these schedules should be
provided to AND-130 and AOP-400 as soon as they become available to ensure
proper communications resource allocation. The program office will ensure the
physical communications connection is provided between each RMS and the
appropriate data multiplex network equipment.

2.1.9 <u>Schedule Requirements</u>. This paragraph should list the milestones and
critical actions to be conducted by the program office. Each milestone should

include the projected date of occurrence. The following milestones should be included as a minimum:

Milestones   Date

Submit Draft Specification
Specification Baselined
SOW submittal
PIP submittal
Contract Award
Request MPS Simulator, RMS Simulator, and ICDDT from AND-130
SRR
SDR
PDR
Draft RMS/MPS ICD Submittal to AND-130
Coordinate RMS to MPS communications
    for all installations
CDR
Baselined ICD Submittal to AND-130
Support Pre-confidence Testing
Provide Confidence Test Site information to AND-130
RMS Available for Confidence Test
Support RMM Operational Test and Evaluation (OT&E)/Integration
Support RMM Operational Test and Evaluation (OT&E)/Shakedown
Support Key Site testing
First ORD
Last ORD

2.1.10 Funding. This paragraph should discuss any funding responsibilities of the program office for all RMS-related activities.

2.2 AND-130 Responsibilities. The MAP office is responsible for filling in sections 2.2.1 through 2.2.11.2.

2.2.1 General Description. This paragraph should describe the overall MAP' architecture that will be implemented to accommodate the _____/RMS. The General Description paragraph should, at a minimum, include the following:

The NAS RMMS consists of a network of hardware and software that is capable of monitoring the operational status of the NAS equipment and facilities. To accomplish this, RMMS employs the following basic subsystems:

RMS - Remote Monitoring Subsystem; an integral part of a facility or equipment that monitors and reports status, provides the capability to execute remote control commands, and serves as a local maintenance access point.

MDT - Maintenance Data Terminal; an external device that can interface to and access the RMMS via an RMS or MPS. When interfaced to the RMS, the MDT is used to access and perform maintenance functions of the RMS, including on site control of the facility for maintenance purposes. The on site MDT is also used to communicate with the MPS via terminal messages with the RMS functioning as a communications transfer device.

MPS - Maintenance Processor Subsystem; the centrally located computer that runs IMCS.

IMCS - Interim Monitor and Control Software; the software system that runs on the MPS which monitors and controls RMS's.

2.2.2 <u>RMS Requirements</u>. This paragraph should discuss AND-130's responsibilities with regard to ensuring that the RMS requirements, as defined in the NAS technical baseline and other documentation (refer to paragraph 3.0, Governing Documentation), are included as part of the F&E project design effort.

2.2.3 <u>Statement of Work (SOW)</u>. This paragraph should describe how AND-130 will review all RMMS-related sections of the F&E project SOW and provide comment to the program office with a 30 day review cycle.

2.2.4 <u>RMS Design Reviews and Technical Interchange Meetings (TIM)</u>. This paragraph should discuss the various design reviews; SRR, SDR, PDR, CDR, TIM's, etc.

2.2.5 <u>Interface Control Document (ICD)</u>.

2.2.5.1 <u>ICD Development Tool (ICDDT)</u>. This paragraph should describe how AND-130 will make available to the program office an ICDDT for use by the F&E project contractor to assist in the development of the RMS and an appendix to the ICD. AND-130 will provide the ICDDT in conjunction with the MPS and RMS simulator.

2.2.5.2 <u>ICD Review</u>. This paragraph should discuss the AND-130 roles and responsibilities in the development, review, and/or resolution of any RMS-related ICD and issues. The following should be included:

AND-130 will review all ICD provided by the program office and provide comments within 30 days of receipt. AND-130 will participate with the program office in the resolution of all RMS ICD issues. All issues will be resolved prior to baselining the ICD.

2.2.6 <u>Testing</u>. This paragraph should describe AND-130's roles and responsibilities for testing applicable to the RMS. Items to be addressed in this paragraph may include coordination, conduct, type of testing, and schedule coordination with the program office for AND-130-sponsored testing.

2.2.6.1 <u>Confidence Testing</u>. This paragraph should describe how AND-130 will perform confidence testing of the IMCS module with an RMS upon completion of the IMCS module development coding. AND-130 will help coordinate with the program office and other appropriate organizations to determine availability of the RMS, communications, and access to the MPS at the ACT (ACN-<u>100D</u> Maintenance Automation test bed) or other MPS, as appropriate. The purpose of confidence testing is to verify that the IMCS module corresponds with the ICD. During this test the monitor and control capabilities of the IMCS will be exercised. This test, also, provides field personnel an opportunity to provide comment and suggestion on the screen presentation of the monitored data. Accepted screen presentation suggestions and variances in IMCS from the ICD will be incorporated by AND-130. The product lead will be notified if AND-130 discovers discrepancies between the ICD and the actual RMS implementation.

2.2.6.2   NAS RMM Operational Test & Evaluation (OT&E)Integration operational Tests.   This paragraph describes the AND-130 and ACN-100D roles and responsibilities in testing the performance and integration of the _____ /RMS into the NAS RMMS.

2.2.7   Plans and Procedures.   This paragraph should describe AND-130's role and responsibilities in generation, review, and comment resolution for all RMS-related plans, procedures, and other documentation produced by the F&E project contractor, PL, or ACN-100D.

2.2.7.1   Test & Evaluation Master Plan (TEMP).   This paragraph should describe AND-130's role and responsibilities in the generation, review, and comment resolution of the TEMP.

2.2.7.2   Project Implementation Plan (PIP).   This paragraph should define AND-130's role and responsibilities in the review and comment resolution of the PIP as it relates to RMS.

2.2.7.3   Other Plans/Procedures.

2.2.8   Data Communications.

2.2.9   Schedule Requirements.   This paragraph should detail the milestones and critical actions to be conducted by AND-130.   Each milestone should include the projected date of occurrence.   The following milestones should be included as a minimum:

Milestones   **Date**

Review Draft Specification
Review Draft SOW
Review Draft PIP
Receive Baselined Specification
Participate in SRR
Participate in SDR
Provide MPS Simulator/ICDDT
Review Draft RMS/MPS ICD
Participate in PDR
Participate in CDR
Receive Baselined RMS/MPS ICD
Coordinate communications requirements
    for RMS connectivity
Code IMCS
Support RMS Preconfidence Testing
Direct Confidence Testing
Support RMM OT&E/Integration Testing
Support RMM OT&E/Operational Testing
Support RMM OT&E/Shakedown Testing

2.2.10   Funding.   This paragraph should discuss any AND-130 funding responsibilities for appropriate RMS-related activities.

Upon receipt of a baselined ICD, AND-130 will fund the development of the IMCS module for the _____/RMS. AND-130 will fund the NAS RMM OT&E Integration and NAS OT&E Operational RMS testing conducted by ACN-100D.

2.2.11 MPS.

2.2.11.1 MPS and RMS Simulators. This paragraph should describe how AND-130 will make available the MPS and RMS Simulators (software, documentation, and technical assistance) for use in the development and test of the _____ /RMS.

2.2.11.2 IMCS Development. This paragraph should describe how MAP will direct the development of the IMCS module per the baselined ICD delivered to AND-130 a minimum of 12 months prior to first ORD of the _____ project.

3.0 GOVERNING DOCUMENTATION.

3.1 Applicable Documents: The most current edition of the following documents shall be used in the design and implementation of the RMMS interfaces unless otherwise stated.

3.1.1 NAS Documents.

NAS-MD-792	Operational Requirements for the Remote Maintenance Monitoring System (RMMS).
NAS-MD-793	Remote Maintenance Monitoring System Functional Requirements for the Remote Monitoring Subsystem (RMS)
NAS-IR-51035101	Remote Monitoring Subsystem/Maintenance Processor Subsystem (RMS/MPS) Interface Requirements Document (IRD)
NAS-IR-51030002	Maintenance Processor Subsystem (MPS) to Automation Subsystems Interface Requirements Document (IRD).
NAS-IR-51034302	Maintenance Processor Subsystem (MPS) to Network Control Center (NCC) Interface Requirements Document (IRD).
NAS-IR-51034201	Maintenance Processor Subsystem (MPS) to Voice Switching & Control System (VSCS) Interface Requirements Document (IRD).

NAS-SR-1000 NAS System Requirements Specification

NAS-SS-1000 NAS System Specification

NAS-DD-1000 NAS Level I Design Document

National Airspace Integrated Logistics Support (NAILS) Master Plan

Capital Investment Plan (for) Facilities, Equipment and Associated Development.

3.1.2 FAA-Standards.

FAA-STD-024   Test and Evaluation.

FAA-STD-025   Preparation of Interface Documentation.

FAA-STD-036   Preparation of Project Implementation Plans.

3.1.3 FAA Orders (current editions).

1100.157   National Engineering Field Support Division
                     Maintenance Program Procedures - National Engineering
                     Field Support Division, AOS-200, and National
                     Automation Engineering Field Support Division, AOS-530

1800.8   NAS Configuration Management.

1810.1   Major Acquisitions

1810.4   FAA NAS Test and Evaluation Policy

6000.30   Policy for Maintenance of the National Airspace System
                     (NAS) Through the Year 2000

6000.32   Security Requirements for Remote Access of NAS
                     Facilities

6030.45   Facility Reference Data File

6090.1   Development and Implementation of Remote Monitoring
                     Subsystems (RMS) Within the National Airspace System
                     (NAS)

3.1.4 Military Standards

MIL-STD-1521   Technical Reviews and Audits for Systems, Equipments,
                     and Computer Software; 4 Jun 85 and Notice 1, 19 Dec 85

4. <u>Acronyms</u>:

CDR	Critical Design Review
F&E	Facilities & Equipment
GFE	Government-Furnished Equipment
IRD	Interface Requirements Document
ICD	Interface Control Document
ICDDT	ICD Development Tool
IMCS	Interim Monitor and Control Software
IV&V	Independent Verification and Validation
LOA	Letter of Agreement
MAP	Maintenance Automation Program
MCS	Monitor and Control Software
MDT	Maintenance Data Terminal (portable and fixed)
MPS	Maintenance Processor Subsystem
TEMP	Test & Evaluation Master Plan
NAILS	National Airspace Integrated Logistics Support
NAS	National Airspace System
NCP	NAS Change Proposal
ORD	Operational Readiness Demonstration
OT&E	Operational Test & Evaluation
PDR	Preliminary Design Review
PIP	Project Implementation Plan
PL	Program Lead
RMMS	Remote Maintenance Monitoring System
RMS	Remote Monitoring Subsystem
SDR	System Design Review
SOW	Statement of Work
SRR	System Requirements Review
T&E	Test and Evaluation
TIM	Technical Interchange Meeting

APPENDIX 2. TEST AND EVALUATION FLOW TASK DESCRIPTIONS

MAINTENANCE AUTOMATION PROGRAM (MAP)
AND
REMOTE MONITORING SUBSYSTEM (RMS)
TEST AND EVALUATION (T&E) FLOW
TASK DESCRIPTIONS

1.   FINALIZATION OF RMS INTERFACE CONTROL DOCUMENT (ICD)

a. MAP DELIVERS TEST TOOLS. MAP shall deliver the test tools software and documentation to the RMS Program Office/RMS contractor. The Interim Monitor and Control Software (IMCS) developer, AOS-530, and ACW-300 shall be listed on the MAP data base to receive all releases of the test tools software, as applicable.

b. CONTRACTOR DEVELOPS RMS DATA BASE & RMS ICD. The RMS contractor shall use the ICD data base development tool (ICDDT) to develop the RMS data base, which shall be an appendix to the RMS ICD.

c. PROGRAM OFFICE DELIVERS APPROVED RMS ICD. An approved RMS ICD and the software data base, as built, shall be available for review. The RMS contractor shall deliver the draft RMS ICD to the RMS program office. The RMS program office shall deliver the draft RMS ICD to MAP.

d. MAP REVIEWS DRAFT RMS ICD. MAP shall review the draft RMS ICD. The review cycle shall be 30-days. MAP shall deliver its RMS ICD comments to the RMS program office.

e. MAP & PROGRAM OFFICE & CONTRACTOR RESOLVE RMS ICD COMMENTS. The RMS program office shall deliver the MAP RMS ICD comments to the RMS contractor. All ICD comments shall be resolved by MAP, the RMS program office, and the RMS contractor. The comment resolution cycle shall result in a signed document between MAP and the program office.

f. CONTRACTOR UPDATES RMS DATA BASE & RMS ICD. The RMS contractor shall update the RMS data base and RMS ICD to reflect the comment resolutions. Once an agreed to ICD or an ICD that is agreed to with a listed number of changes signed by both the PL and MAP then the ICD will be used to build the IMCS module and the RMS.

g. PROGRAM OFFICE DELIVERS BASELINED RMS DATA BASE & RMS ICD. The RMS contractor shall deliver the baselined RMS data base and the approved RMS ICD to the RMS program office, which in turn shall deliver them to MAP at Critical Design Review (CDR) or a minimum of 12 months prior to the first Operational Readiness Demonstration (ORD). The baselined RMS data base and the baselined RMS ICD shall be under configuration management (Order 1800.8F). Modifications shall go through an NCP process which is coordinated and approved by the program office and MAP.

h. **MAP DELIVERS BASELINED RMS DATA BASE & RMS ICD.** MAP shall deliver the baselined RMS data base and the approved RMS ICD to the IMCS developer and ACW-300.

2. **SOFTWARE DEVELOPMENT AND TEST READINESS.**

a. **IMCS DEVELOPER DEVELOPS IMCS RMS DECODER.** The IMCS developer shall develop the IMCS RMS decoder in accordance with the baselined ICD.

b. **ACW-300 DEVELOPS NAS OT&E/INTEGRATION AND OT&E OPERATIONAL TEST PLANS TEST PLAN & TEST PROCEDURES.**
ACN-100D shall develop the test plan and test procedures for the NAS OT&E/integration and OT&E/Operational testing of the RMS.

c. **ACN-100D VERIFIES RMS ICD WITH TEST TOOLS & RMS DATA BASE.**
ACW-300 shall verify the approved RMS ICD with the test tools (i.e., MPS simulator and RMS simulator) and the RMS data base.

d. **Program Office RMS/IMCS Preconfidence Testing.** The contractor shall provide for a dial up telephone connection so that the RMS may be pre-confidence tested before confidence testing is formally begun.

e. **CONTRACTOR DEVELOPS RMS.** The RMS contractor shall develop the RMS in accordance with the approved ICD.

f. **CONTRACTOR TESTS WITH TEST TOOLS.** The RMS contractor shall use the test tools at it's development site to test the MPS/RMS interface.

g. **CONTRACTOR CONDUCTS FACTORY TEST.** The RMS contractor shall complete validation of as many specification requirements as can be accomplished at the factory by conducting the production Factory "Engineering Quality" Test of the RMS using the MPS Simulator running on the contractor's PCs.

h. **PROGRAM OFFICE SUBMITS TEST NCP.** The program office shall submit a test NAS Change Proposal (NCP) to MAP, which shall specify the RMS test site and operational MPS to be used for the NAS Confedence testing and the OT&E/intergration and confidence testing of the RMS. This action must be accomplished early in the project if the Confidence Test (3a.) is to take place at an operational MPS versus the ACT. The NCP shall be applicable to both the RMS and the decoder.

3. **SOFTWARE DEVELOPMENT TESTING.**

a. **IMCS DEVELOPER CONDUCT CONFIDENCE TEST.** The IMCS developer shall jointly conduct a series of interactive tests known as the Confidence Test. The purpose of the Confidence Test shall be to establish and demonstrate link level communications of the MPS/RMS and validate that the IMCS decoder and RMS hardware and software reflect the contents of the approved ICD. To support this endeavor, application level messages shall be analyzed cursorily, i.e., to verify transmission and receipt of the messages, not to perform an in-depth analysis of their contents. Connectivity from the MPS to the RMS shall be via modem. The IMCS developer and the RMS program office shall modify their respective software/hardware, as necessary, to accomplish successful link level communications and to comply with the contents of the approved ICD. Additionally, the RMS product lead, with field support where possible, shall

assist the IMCS developers with deciding proper nomenclature for data descriptions and grouping the data into appropriate screen contents, e.g., quick-look, certification, status, etc.

4.   SOFTWARE QUALIFICATION TESTING.

     a. ACW-300 CONDUCTS V&V BASELINE TEST. Upon successful completion of the Confidence Test, ACN-100D shall conduct the Verification and Validation (V&V) Baseline Test. The purpose of the V&V Baseline Test shall be to test communications of the IMCS RMS decoder and the RMS at the application level. ACN-100D shall transmit commands from the MPS via the IMCS with the draft RMS decoder. ACW-300 shall perform an in-depth analysis of the contents of the application messages transmitted from the MPS and the RMS to verify message consistency with the RMS ICD. Depending on the complexity of the RMS, ACW-300 may use the RMS simulator to verify that the IMCS decoder corresponds to the RMS ICD. Connectivity from the RMS to the MPS at the ACT shall be via modem.

     b. IMCS DEVELOPER UPDATES IMCS DECODER. The IMCS developer shall update the IMCS decoder, as necessary, depending on the results of the V&V Baseline Test.

     c. IMCS DEVELOPER DELIVERS BASELINED IMCS DECODER. The IMCS developer shall deliver the baselined IMCS RMS decoder to MAP.

     d. MAP DELIVERS BASELINED IMCS DECODER. MAP shall deliver the baselined IMCS RMS decoder to ACW-300 and AOS-530.

     e. CONTRACTOR UPDATES RMS. The RMS contractor (as directed by the RMS Program Office) shall update the RMS, as necessary, depending on the results of the V&V Baseline Test.

     f. CONTRACTOR CONDUCTS SITE ACCEPTANCE TEST. The product lead shall require the contractor to complete the DT&E at the first site by conducting the Site Acceptance Test (SAT) of the RMS using the MPS simulator running on the contractor's PC's. The SAT shall culminate in Contractor Acceptance Inspection (CAI), upon which the RMS ("one system") shall become the property of the Government.

5.   NAS RMM OT&E INTERGRATION.

     a. ACW-300 CONDUCTS MPS CORE TEST. ACW-300 shall conduct the MPS Core Test of the baselined IMCS decoder using the MPS at the FAA Technical Center or at an operational MPS. The MPS Core Test shall verify the integration of the IMCS RMS decoder into the existing IMCS.

     b. ACW-300 CONDUCTS NAS RMM OT&E RMM INTEGRATION and OT&E OPERATIONAL TESTING. ACW-300 shall conduct the NAS OT&E RMM Integration and OT&E Operational testing of the RMS. Connectivity of the RMS at the first site to the MPS at the FAA Technical Center shall be via modem.

     c. ACW-300 DELIVERS NAS OT&E INTEGRATION REPORT. ACW-300 shall deliver the NAS RMM OT&E Integration and Operational RMS Letters of Findings followed by the NAS OT&E intergration of the RMS Test Reports.

    d. AOS-530 CONDUCTS NAS OT&E SHAKEDOWN TEST. AOS-530 shall conduct the
NAS OT&E Shakedown of the imcs DECODER at the MPS/RMS test site on all newly
developed RMS systems.

    e. AOS CONDUCTS OT&E SHAKEDOWN TEST. AOS-530 shall conduct the OT&E
Shakedown Test of the IMCS RMS decoder. AOS-530/200 shall conduct the QA test
of the RMS design, hardware, software, firmware, and associated documentation.

    f. ACN/AOS SUBMIT INTEGRATION SHAKEDOWN REPORTS(s). Either joint or
seperate Integration and Shakedown testing reports are made by ACN and AOS.

6. NAS OT&E SHAKEDOWN.

    a. AOS-530 OR AOS-200 DELIVERS NAS OT&E/SHAKEDOWN TEST REPORT. AOS-530
or AOS-200 shall deliver the NAS RMM OT&E/shakedown "quick look" report
followed by the NAS RMM OT&E/shakedown Test Report. These reports are
important to the Deployment Readiness Review (DRR) process.

    b. RMS PROGRAM OFFICE PARTICIPATES IN DRR/DEPLOYMENT DECISION. The RMS
(or MAP) program office shall participate in a DRR which, among other things,
shall review the results of the NAS RMM OT&E/Integration of the RMS. A
favorable review should result in the RMS being given a deployment decision
for installation at a field site.

    c. AOS-530 GENERATES IMCS RMS DECODER SPB FOR KEYSITE TEST.
AOS-530 shall generate a Site Program Bulletin (SPB) for the Keysite Test of
the IMCS RMS decoder, which shall be conducted at an operational MPS. As
required, AOS-530/200 shall generate an Electronic Equipment Modification
(EEM) to implement installation of a retrofit RMS in an operational
environment.

    d. AOS-530 CONDUCTS QA TEST OF IMCS RMS DECODER KEYSITE SPB.
AOS-530 shall conduct the QA Test of the IMCS RMS decoder Keysite Test SPB by
verifying the SPB, installation instructions, and supporting documentation.

    e. AOS-530 SUPERVISES KEYSITE TEST OF IMCS RMS DECODER SPB.
AOS-530 shall supervise the Keysite Test of the IMCS RMS decoder SPB, which
shall be conducted by field personnel at an operational MPS.

    f. AOS-530 GENERATES IMCS RMS DECODER SPB FOR NATIONAL RELEASE. AOS-
530 shall generate an SPB for national release of the IMCS RMS decoder and
shall incorporate any changes which result from the Keysite Test.

7. POST-TESTING ACTIVITIES.

    a. AOS-530 RELEASES IMCS RMS DECODER SPB. AOS-530 shall release the
SPB for national inclusion of the IMCS RMS decoder on all operational MPS's.
As required, AOS-530/200 shall release the EEM authorizing installation of
retrofit RMS hardware and software.

FIGURE 1. MAINTENANCE AUTOMATION PROGRAM (MAP) AND REMOTE MONITORING SUBSYSTEM (RMS)
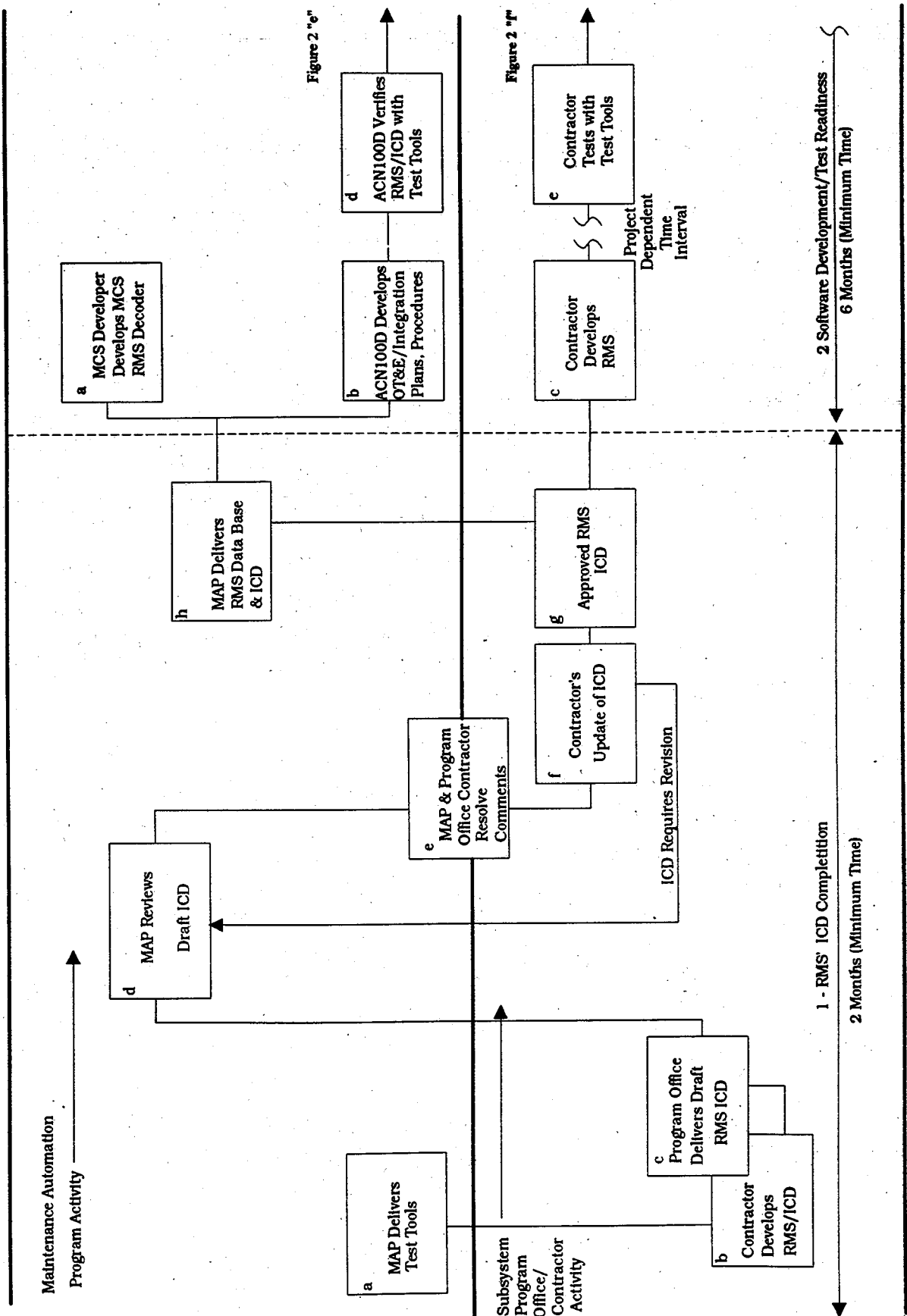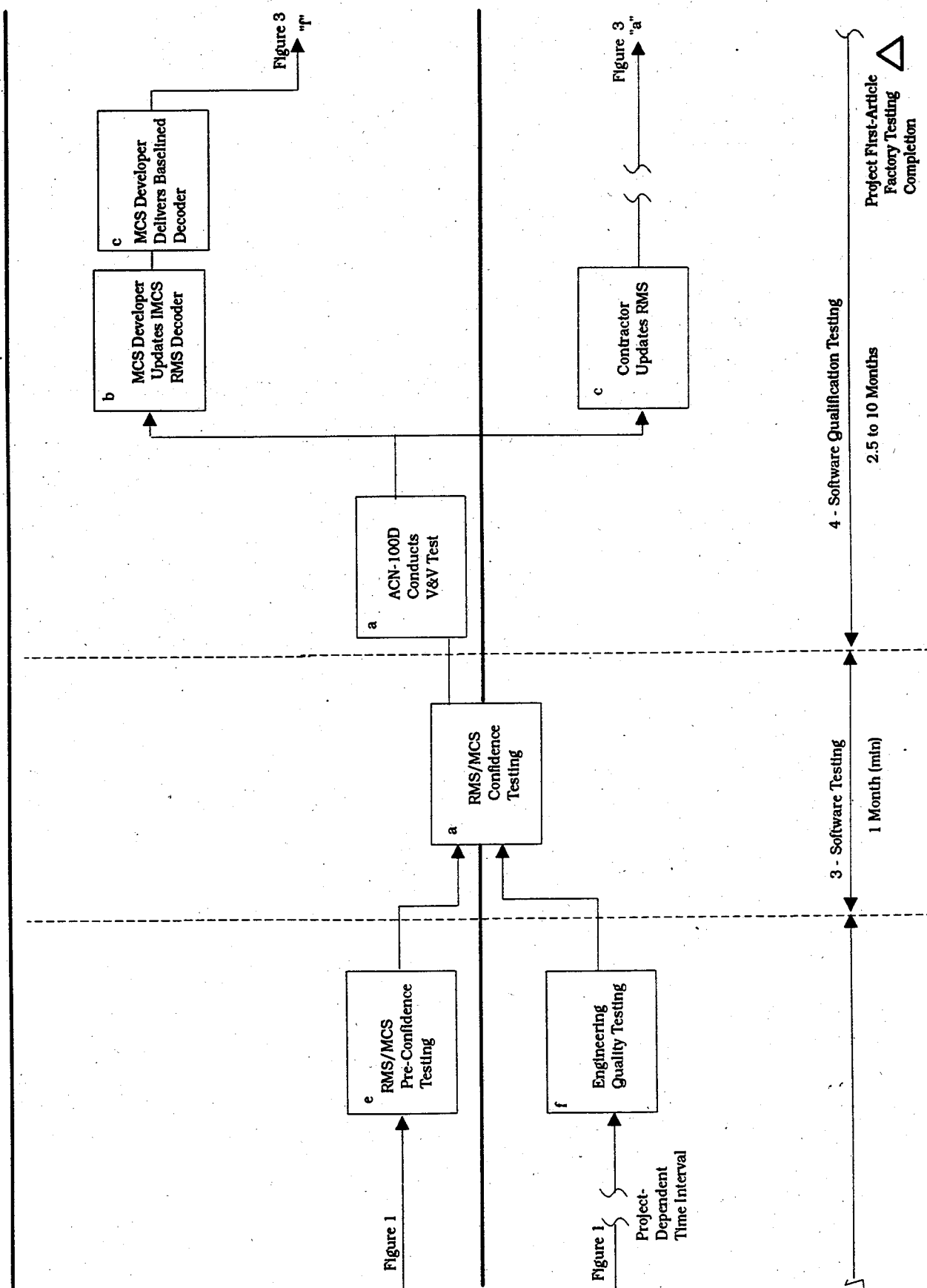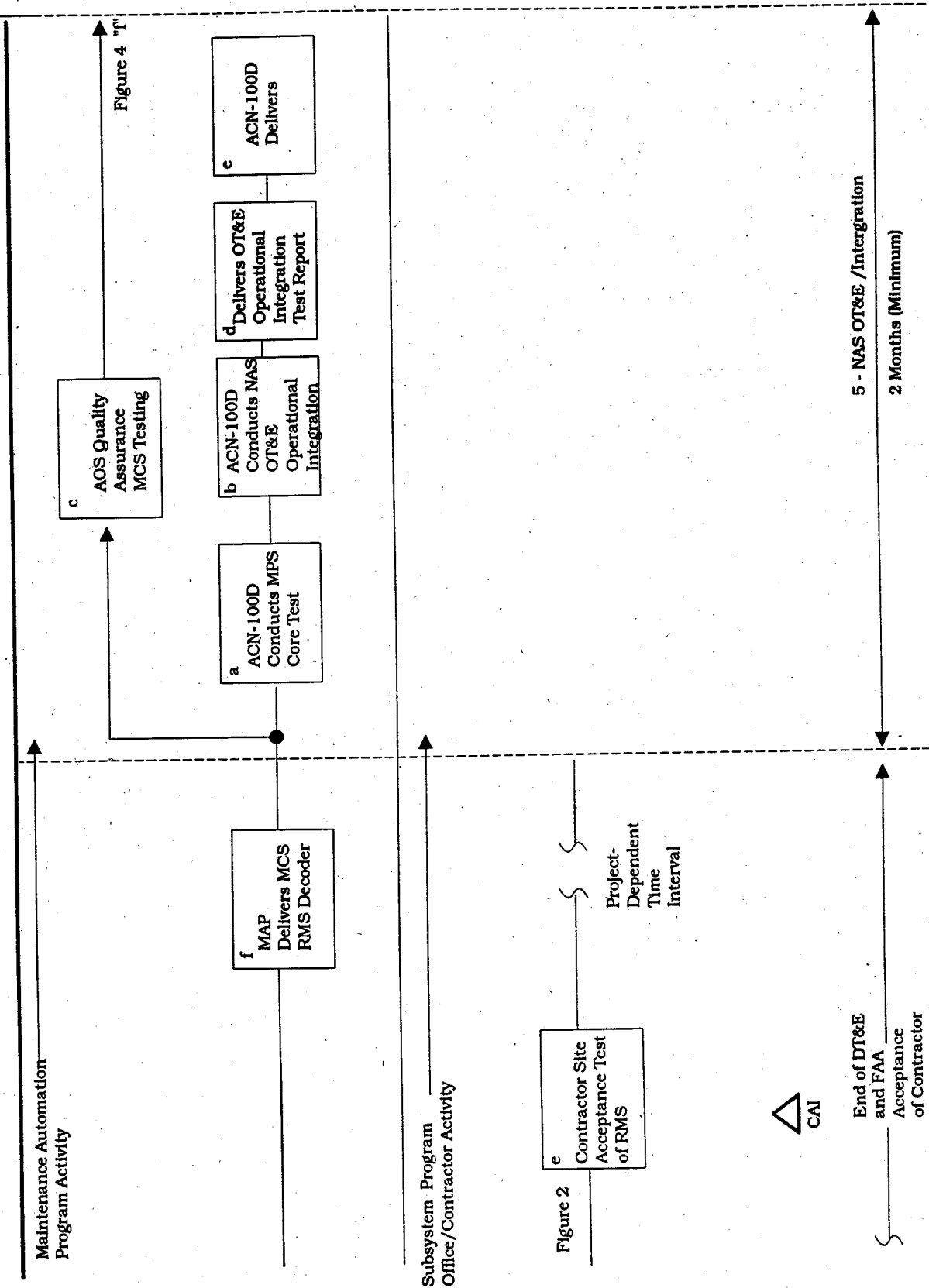## TEST AND EVALUATION IMPLEMENTATION FLOW

FIGURE 2. MAINTENANCE AUTOMATION PROGRAM (MAP) AND REMOTE MONITORING SUBSYSTEMS (RMS)
TEST AND EVALUATION IMPLEMENTATION FLOW

FIGURE 3. MAINTENANCE AUTOMATION PROGRAM (MAP) MONITORING SUBSYSTEM (RMS) TEST AND EVALUATION IMPLEMENTATION FLOW

Maintenance Automation
Program Activity

Figure 4 "T"

c   AOS Quality Assurance MCS Testing

a   ACN-100D Conducts MPS Core Test

b   ACN-100D Conducts NAS OT&E Operational Integration

d   Delivers OT&E Operational Integration Test Report

e   ACN-100D Delivers

f   MAP Delivers MCS RMS Decoder

Subsystem Program
Office/Contractor Activity

Figure 2

e   Contractor Site Acceptance Test of RMS

Project-
Dependent
Time
Interval

△
CAI

5 - NAS OT&E /Intergration

2 Months (Minimum)

End of DT&E
and FAA
Acceptance
of Contractor
First-Article

FIGURE 4. MAINTENANCE AUTOMATION PROGRAM (MAP) AND REMOTE MONITORING SUBSYSTEM (RMS) TEST AND EVALUATION IMPLEMENTATION FLOW